Iterative Recon

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Iterative recon

- Concerns
  - How accurate does CAL energy seed to Kalman need to be?
    - At low E, small fraction of E reaches CAL.
      - For Einc = 100 MeV, <Eobs> ~ 50 MeV
      - For Einc = 50 MeV, <Eobs> ~ 20 MeV
    - At high E, most E blows out the back.
      - For Einc = 10 GeV, <Eobs> ~ 6 GeV
      - For Einc = 100 GeV, <Eobs> ~ 40 GeV
    - Is a simple CAL sum good enough?
    - Or do we need to implement simple corrections prior to TkrRecon?
      - We *could* add TKR energy by scaling number of TKR hits.
      - We *could* scale Eobs by an average correction factor:
        - » use xtal ID to give crude angle estimate and scale Eobs by an average profile correction factor (which is a fcn of Eobs and theta).

Iterative recon

- Concerns
  - Does TKR direction recon depend on species?
    - Does it matter if we pretend a heavy ion is an EM shower?
  - CAL needs TKR track to correct individual xtal energies
    - For best energy resolution
    - To correct for diode failures (need to account for light taper).

Iterative recon

- Outline of process

1. CAL: Convert to charge units
   - Use electronic calib. Convert from ADC bins to charge at FEE.
2. CAL: Calculate energy in each xtal
   - Convert to MeV at center of xtal. Assume position = center of xtal.
3. CAL: Calculate total energy deposited
   - Simple xtal sum
4. CAL+TKR: Make simple energy corrections (necessary?)
   - Scale by avg-profile correction, f(Eobs,θ)?
   - Add simple TKR energy correction, i.e. scale by num hits?
5. CAL: Simple energy centroid (necessary?)
   - Calculate centroid in XZ and YZ planes using logID positions.

Iterative recon

- Outline of process (cont.)

5. TKR: Direction recon
   - I'm clueless here, insert the real TKR stuff.
6. TKR: Energy recon
   - Do the best TKR energy-loss correction, following daughters or whatever.
7. CAL: Recalculate energy in each xtal
   - Use TKR direction. Accounts for failures and light tapering maps.
8. CAL: Recalculate total energy deposited
   - Total all xtal energies, having accounted for failures and taper.
9. CAL: Recalculate simple energy centroid
   - Repeat simple centroid, having accounted for failures and taper.

Iterative recon

- Outline of process (cont.)

10. ACD+CAL+TKR: Particle ID (necessary here, or later?)
    - Some complicated algorithms to confirm photon or particle.
11. TKR(+CAL): Direction recon
    - Do the real TKR direction recon. Use CAL info to improve direction for late conversions, if possible.
12. CAL+TKR: Energy recon
    - Use best CAL and TKR information to estimate incident energy.
    - Use profiling, leakage correlation, TKR info, whatever.
13. Iterate steps 10-12?

CAL-specific needs in PDA